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ALGEBRA.

173. Proposed by JOHN M. COLAW, A. M., Monterey, Va.

Solve $\sqrt[3]{(a+x+y)}=x\dots(1)$, $\sqrt[3]{(b+y+z)}=x\dots(2)$, $\sqrt[3]{(c+z+x)}=x\dots(3)$.

Solution by L. C. WALKER, A. M., Graduate Student, Leland Stanford Jr. University, Cal.

From (2), (3), and (1), we have

$$x^3 - y - z = b\dots(4),$$

$$y^3 - z - x = c\dots(5),$$

$$z^3 - x - y = a\dots(6).$$

From (4) and (5); from (5) and (6); from (6) and (4), we have

$$(x-y)(x+y+1)=b-c\dots(7),$$

$$(y-z)(y+z+1)=c-a\dots(8),$$

$$(z-x)(z+x+1)=a-b\dots(9).$$

By addition of corresponding members of (7), (8), (9), we get

$$(x-y)(x+y+1)+(y-z)(y+z+1)+(z-x)(z+x+1)=0\dots(10).$$

It is easy to see that either $x=y=z\dots(11)$,

$$\text{or } x+y+1=y+z+1=z+x+1=0\dots(12),$$

will satisfy (10). From (11), (4), (5), (6), we find

$$x=y=z=1\pm\sqrt[3]{(b+1)}, 1\pm\sqrt[3]{(c+1)}, 1\pm\sqrt[3]{(a+1)}.$$

From (4), (5), (6), (12), we obtain

$$x=\pm\sqrt[3]{(b-1)}, y=\pm\sqrt[3]{(c-1)}, z=\pm\sqrt[3]{(a-1)}.$$

Also solved by MARCUS BAKER, and G. B. M. ZERR.

174. Proposed by HARRY S. VANDIVER, Bala. Pa.

If the quantity x be expressed in the form of a continued fraction P_n/Q_n denoting the $(n+1)$ th convergent, with x_n the corresponding complete quotient,

then $\frac{P_{n-(k-1)} - Q_{n-(k+1)}x}{P_n - Q_nx} = (-1)^{k+1}x_n \times x_{n-1} \dots x_{n-k}$.

Solution by G. B. M. ZERR, A. M., Ph.D., The Temple College, Philadelphia, Pa., and J. E. SANDERS, Hackney, Ohio.

$$x = \frac{x_n P_n + P_{n-1}}{x_n Q_n + Q_{n-1}} \text{ or } x_n = \frac{x Q_{n-1} - P_{n-1}}{P_n - x Q_n}.$$